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GAS ABSTRACTS

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1. GAS INDUSTRY

Federal Power Commission

Crosby, S. H. THE FEDERAL POWER COMMISSION SWINGS BACK TO THE LEFT. *Gas* **24**, 29-32 (1948) *December.*

This is the third and concluding article in a series entitled "The Natural Gas Investigation and After". Election of a Congress composed largely of Democrats and "liberal" Republicans makes it unlikely that any amendment to the Natural Gas Act will be passed for at least two years. Rather than reducing the powers of the Federal Power Commission the new Congress may seek to regulate the oil and coal industries.

J. C. Lane

LP-Gas

Martin, E. R. HOW APPLIANCES SOLD IN '48. *LP-Gas* **9**, 148, 150, 160 (1949) *February.*

The statistics show that since 1941 domestic gas ranges sold for use with LP-gas have increased from 15 to 26% of the total gas ranges sold, and that water heaters have increased from 7.4 to 12.5% of the total gas water heaters sold. Statistics are not available for space heating equipment. Appliance manufacturers are advised to plan for expansion and maintenance of LP-gas appliance markets on a long basis.

E. F. Davis

Rugh, K. W. and Mattocks, E. O. 2600 MILLION GALLONS OF LIQUEFIED PETROLEUM GAS MARKETED DURING 1948. *World Oil* **128**, 154-155 (1949) *February;* LP-GAS SALES CONTINUE GAINS IN 1948. *Petroleum Refiner* **28**, 159-160 (1949) *January; Gas Age* **103**, 48-50, 78, 80 (1949) *January* **6**; INDUSTRY SOARS TO NEW HEIGHTS WITH SALES OF 2,600,000,000 GALS. *Butane-Propane News* **11**, 39-45 (1949) *January;* YEAR'S INCREASE IN LP-GAS SALES TOPS TOTAL 1942 OUTPUT. *Gas* **25**, 35-36 (1949) *January;* LP-GAS CONSUMPTION INCREASES 29.5% IN 1948. DOMESTIC USE RISES 33.9%. *Natl. Petroleum News* **40**, 29-31 (1948) *December* 29; LP-GAS CONTINUES RAPID GROWTH. *Am. Gas Assoc. Monthly* **31**, 17-18, 35 (1949) *January.*

Estimates of marketed LP-gas production during 1948 show a 29.5% increase over 1947, an increase greater than the total amount marketed in 1942 and a total 1948 volume equal to almost one fourth of the quantity marketed since 1930. That sold for domestic purposes in 1948 was about 1540 million gallons, a third higher than in 1947 and more than the total quantity sold for all purposes in 1946. Approximately 25% of the gas ranges produced in 1948 went into the LP-gas market, and the demand for LP-gas water heaters and refrigerators continued to increase. Some 5.5 million homes are estimated to be using LP-gas, one third of which employ LP-gas for space heating as well as other purposes. Data are given on LP-gas use for peak loads and base loads, as well as for chemical manufacture.

J. C. Lane

Natural Gas

DeGolyer, E. THE NATURAL GAS INDUSTRY. *Petroleum Engr.* **20**, 148, 150, 152, 154, 160 (1948) *December.*

Speaking before a meeting of the National Securities Traders Association, the author emphasized the strong competitive position of natural gas in respect to coal and oil. With a proved-reserve-to-production ratio more than twice that of oil and prospects that substantial new reserves will continue to be found, the natural gas industry will continue to flourish for many years. Demand, now already greater in many sections than existing pipe lines can satisfy, should continue to increase. Gas has always been the most desirable fuel from the standpoint of convenience. Now it is often the most economical fuel as well. In 1938 residential consumers paid approximately 6.2 cents per therm for coal, 7.6 cents for oil and 8.6 cents for gas. By 1943, the prices per therm had shifted to 7.2 cents for coal, 7.8 cents for gas and 8.5 cents for oil. In mid-1947, the last date for which figures are available, gas was the least expensive fuel, costing 7.6 cents per therm, while coal cost 10.5 cents and oil cost 13.6 cents. Of the total amount of energy supplied by oil and gas, which now

equals that supplied by coal, natural gas furnished about one-fourth in 1920 and now supplies about one-third. The author cited a number of factors influencing the attractiveness of the securities offered by natural gas companies, concluding that producing and transmission companies offer unusually attractive possibilities for investment.

J. C. Lane

NATURAL GAS PRODUCTION CONTINUES SPECTACULAR GAINS. *World Oil* **128**, 148-151 (1949) *February* 15.

Preliminary figures indicate that marketed production of natural gas during 1948 totaled 4.9 trillion cu ft., 0.5 trillion more than in 1947. Pipe line and natural gasoline plant expansion programs are expected to up the 1949 marketed production to some 5.5 trillion cu ft. Approximately 7500 miles of new natural gas pipe lines were placed in operation during 1948; another 7500 miles will be completed during 1949; and still another 7500 miles are scheduled for completion in 1950 and 1951. In addition to the aforementioned projects, application pending before the Federal Power Commission total 15,000 miles. Utility sales of natural gas in 1948 amounted to 2.8 trillion cu ft., 11.4% more than in 1947. Reserves, production and marketed production statistics are given for a number of years.

J. C. Lane

Pipe Lines

Kastrop, J. E. PIPE LINE CONSTRUCTION REACHES RECORD 14,821 MILES. *World Oil* **128**, 195-196 (1949) *February* 15.

During 1948, a total of almost 15,000 miles of line pipe were placed in operation, of which 7,414 miles were for gas, 5,669 for oil, and 1,738 for petroleum products.

J. C. Lane

STATISTICS ON NATURAL GAS PIPE LINE PROJECTS AUTHORIZED BY THE FEDERAL POWER COMMISSION SINCE FEBRUARY 7, 1942. Federal Power Commission Release, February, 1949.

Data on natural gas pipe line projects by 83 companies to whom the Federal Power Commission issued certificates since February 7, 1942 are presented. The estimated cost is approximately $1,158,600,000 and about 54% of this has been spent to date. 2,184,585 tons of steel are involved, and only 821,447 tons have been received by August 31, 1948, although the bulk of the remainder is expected by the end of 1950.

J. D. Parent

The following article, which has not been abstracted, is called to your attention:

STEEL OUTLOOK: ADEQUATE TUBULAR GOODS, SHORTAGE OF LINE PIPE. *World Oil* **128**, 100-101 (1949) February.

2. APPLIANCES

Changeover

Gibson, R. STORY OF GAS CHANGE-OVER. *Am. Gas Assoc. Monthly* **31**, 5-6, 45 (1949) *February*.

A description is given of the appliance adjustment required in a change-over from a 540 Btu, 0.68 gravity gas to a propane-air mixture of 864 Btu and 1.17 gravity.

E. F. Davis

3. COMBUSTION AND INDUSTRIAL FURNACES

Atmospheric Furnaces

Segeler, C. G. SAFE OPERATING PROCEDURES FOR DIFFERENT TYPES OF SPECIAL ATMOSPHERIC FURNACES. *Ind. Heating* 16, 58, 60, 62, 64 (1949) *January.*

This article gives information on safe procedures for operation of atmosphere generators and the furnaces supplied with them. It also covers special furnace atmospheres, both combustible and non combustible types; instrumentation; starting, operating, and shutting down procedures; and toxic gas hazards.

E. F. Davis

Combustion

Audibert, E. THE COMBUSTION OF METHANE/AIR MIXTURES. *Fuel* (British) 27, 145-154 (1948) *November-December.*

Mallard and LeChatelier's thermal theory of the combustion of methane-air mixtures is rejected and a chain-reaction mechanism is proposed. The primary chain involves the intermediate compound, methylhydroperoxide CH_3OOH, which may decompose by heterogeneous and/or homogeneous processes. The heterogeneous reaction is chain-breaking; the homogeneous, chain-branching. Thus, ignition is induced by promoting the homogeneous reaction; the flame is arrested when conditions favor the heterogeneous process. The combustion is completed by secondary stationary-chain reactions which involve the primary products, carbon monoxide and hydrogen. .

A. J. Rudnitzki

Bridger, G. W. and Appleton, H. THE INHIBITION OF THE COMBUSTION OF CARBON AND CARBON MONOXIDE. *J. Soc. Chem. Ind.* (British) 67, 445-448 (1948) *December.*

Studies of the effects of various chlorine-containing inhibitors on the combustion reactions of carbon with oxygen have led to the conclusion that the reaction occurs in several stages. Carbon monoxide formation is shown to precede the formation of carbon dioxide.

S. Katz

Kaye, J. THERMODYNAMIC PROPERTIES OF GAS MIXTURES ENCOUNTERED IN GAS-TURBINE AND JET PROPULSION PROCESSES. *J. Applied Mechanics* 15, 349-361 (1948) *December.*

The working fluid in gas turbines and jet engines is a mixture of gases and not a single pure substance. The correlation of the thermodynamic data is thus complicated by the introduction of the composition as an additional independent variable. A method of presenting the data in tabulated form for the hydrocarbon fuel $(CH_x)_n$ in the full range of lean mixtures with air, is proposed. The data are suitable for the calculation of isentropic compression and expansion, heat transfer at constant pressure and constant volume, combustion, flow, mixing, etc. The use of the tables is illustrated in sample problems.

A. J. Rudnitzki

Powling, J. A NEW BURNER METHOD FOR THE DETERMINATION OF LOW BURNING VELOCITIES AND LIMITS OF INFLAMMABILITY. *Fuel* (British) 28, 25-28 (1949) *February.*

A method has been devised for obtaining a flat stationary flame as a preliminary to determining burning velocities at inflammability limit mixtures. The inflammability limits have been found to be lower than those quoted in the literature for n-propane and n-butane. Spectroscopic studies of flame phenomenon can be facilitated by use of this flat flame since the preflame zone may be studied without interference of subsequent reactions and any depth of absorption or emission may be obtained according to the dimensions of the burner.

E. F. Davis

Combustion Chambers

Stone, R. L. TUBULAR COMBUSTION CHAMBERS. *Am. Gas Assoc. Monthly* **31**, 13-15, 38 (1949) *February.*

A discussion of a research project on the fundamentals of combustion in vertical tubular burners is given. Particular emphasis is placed on a zone which is defined as the recirculation zone. Photographs and descriptions are given of single port and multiport burners.

E. F. Davis

Gas Turbines

Hall, O. D. GAS TURBOGENERATORS TO PROVIDE ELECTRIC POWER IN OKLAHOMA. *Gas* **25**, 40-41 (1949) *January.*

From the viewpoint of smaller space and negligible water requirements, lower capital investment, higher thermal efficiency and possible future obsolescence of steam turbine-electric plants, the Oklahoma Gas and Electric Company will install a new natural gas-fired, simple open cycle, 3500 KW turbogenerator to augment increased power demand at the A. S. Huey station. For somewhat similar reasons, a natural gas-fired, regenerative open cycle gas turbine-electric generating unit is comtemplated by the Public Service Company of Oklahoma. Design operating conditions are described.

C. Von Fredersdorff

Karrer, W. THE EXPERIMENTAL GAS TURBINE PLANT AT THE OERLIKON WORKS IN SWITZERLAND. *Engrs. Digest* **5**, 229-232 (1948) *July* from *Schweizerische Bauzeitung*, **66**, *No.* **21**, 291-296 (1948) *May* 22.

A 1000 KW experimental open-cycle recuperative gas turbine consisting of a high pressure turbine and a low pressure turbine in series driving the generator and air compressor respectively, has been successfully operated for 3000 hrs. Seamless fin tube heat exchanger construction has resulted in 75-80% recuperator effectiveness. Centrifugal compressor efficiencies were increased from 76 to 88% by dividing the compressor casing into four volute sectors each provided with a diffuser. Other mechanical features, fuel control mechanisms and cross sectional views of the turbines and auxiliaries are included.

C. Von Fredersdorff

Karthauser, F. B., Battcock, W. V. and Ross, F. F. THE COAL-FIRED GAS TURBINE. *J. Inst. Fuel* (British) **22**, 58-72 (1948) *December.*

Although the coal-fired gas turbine will be more costly and less efficient than the oil fired turbine, certain fields of application are open for it, such as: (1) boiler plant with pressure combustion; (2) pressure combustion with waste heat boiler; and (3) locomotive power generation. Among the possible economic coal-fired gas turbine cycles are the simple open cycle, regenerative open cycle and the regenerative open cycle with compressor intercooling, the estimated thermal efficiencies of which are 14.4, 20 and 22%, respectively. The problems of fuel cost, fuel preparation, efficient pressure combustion, gas cleaning, turbine blade design and metallurgy, and turbine inlet temperature, which are of primary importance in gas turbine applications, are discussed in considerable detail. Considerable research on a coal-fired gas turbine locomotive is being conducted at the present time. Simple flow diagrams of nine possible gas turbine cycles and a partial summary of existing and proposed gas and oil-fired units are presented.

C. Von Fredersdorff

Lubbock, I. THE GAS TURBINE AND ITS COMBUSTION PROBLEMS. PART I. *Petroleum* (British) **12**, 8-11, 13 (1949) *January.*

Thermodynamic treatment of the primary and recuperative gas turbine cycle indicates the necessity of obtaining (1) better turbine blade materials and blade cooling; (2) compressors for high efficiency and compression ratio; (3) high air preheat to the combustion chamber; and (4) laminar flow (low pressure drop) regenerator or recuperator. Normal gas turbine operation with no air preheat and 600°C turbine inlet temperature results in a thermal efficiency of 18%. With air preheat and a 1000°C turbine inlet temperature, a maximum efficiency of 44% can be computed. Present problems in-

clude (1) satisfactory burner and combustion chamber design to handle heavy fuel oils without coke deposition on turbine blades, and (2) economic limit of recuperator or regenerator effectiveness. A description of a proposed multiple tip burner, and typical oil atomization and turbine efficiency curves are presented.

C. Von Fredersdorff

Lubbock, I. THE GAS TURBINE AND ITS COMBUSTION PROBLEMS. PART II. *Petroleum* (British) **12**, 37-39 (1949) *February.*

A comparison of steam, diesel and gas turbine prime movers is made. For locomotive application the oil-fired gas turbine has an average thermal efficiency of 16% compared to 24% for the diesel, and operating fuel costs are 1.1 to 1.5 times as great as the diesel. In order to become competitive, the gas turbine maintenance cost must be about 25% less than that of the diesel and the combustion system must be designed to handle increasingly heavier, cheaper fuel oil. For marine application the diesel is favored in sizes up to 8000 HP while the steam turbine is employed in sizes greater than 8000 HP. The gas turbine has not shown any particular application. For power production gas turbine units are limited to 15,000 KW at a thermal efficiency of 29% while steam turbines are used up to 60,000 KW at a thermal efficiency of 31%. A combination of steam and gas turbines can be achieved by burning oil under pressure and expanding the steam generated and combustion products produced through separate turbines as in the case of the Brown-Boveri Velox boiler and the French equipressure boiler. Combination steam-gas turbine plants may attain up to 42% thermal efficiency. For industrial application the gas turbine is particularly applicable as a high capacity compressor by utilizing readily available combustion products as in the case of the Houdry catalytic refining process and in the transmission of natural gas. Various schemes have been proposed for combined power and steam heating gas turbine plants.

C. Von Fredersdorff

Tucker, W. B. CONSTRUCTION OF GAS TURBINE FOR LOCOMOTIVE POWER PLANT. *Mech. Eng.* **70**, 877-882 (1948) *November.*

The physical arrangement of the gas turbine, compressor, electric generators, combustor, ash separator, and recuperator of a proposed regenerative open-cycle coal-burning gas turbine locomotive was worked out to utilize most effectively the space available in the locomotive cab and to minimize excessive stress on the locomotive frame. Design features as to alloys used, turbine blading, bearings, gearing and oiling system are described.

C. Von Fredersdorff

Tucker, W. B. GAS-TURBINE POWER OFFERS FEATURES AS HIGH-SPEED PRIME MOVER. *Oil Gas J.* **47**, 65-66 (1949) *January* 20.

The principles of the gas turbine open cycle including methods of increasing thermal efficiency are described. Some indicated advantages of gas turbines are: (1) high speed and direct coupling to driven unit is possible; (2) variable speed operation; (3) no water requirement; (4) maintenance cost is comparable to other prime movers; (5) very little lubrication is required; (6) weight to power ratio is low; (7) they are independent of outside sources of power and require short warm up period; and (8) low grade fuel oil can be burned. Application as a pipe line compressor is stressed. Some characteristic curves of performance are included.

C. Von Fredersdorff

Producer Gas Engine

Hurley, T. F., and Fitton, A. THE EMERGENCY USE OF PRODUCER GAS FOR ROAD TRANSPORT. *J. Inst. Fuel* (British) **21**, 283-298 (1948) *August.*

Test results are reported for mobile gas engines operated with the early up-draught type producer, dry-blast cross-draught producer and wet-blast cross-draught producer. The program of tests included the use of charcoal, coke made from non-caking low rank coals and medium

coking coals, commercial low temperature coke of various reactivities, catalyst-impregnated coke and anthracite. Charcoal, 600°C low temperature coke, low temperature briquettes and some anthracites were found to be satisfactory fuels from the standpoint of gas calorific value and operating flexibility. The addition of sodium carbonate as a catalyst in quantities up to 1.4 weight per cent of fuel markedly increased the heating value of the producer gas and improved the operating flexibility of many of the fuels tested. Other variables studied included variation of the quantity of water injected with the air and the effect of air preheat. A complete summary of road tests, producer gas analyses, thermal efficiencies and diagrams of the producer types are included.

C. Von Fredersdorff

Utilization

Dickinson, F. COMMERCIAL AND INDUSTRIAL UTILIZATION OF GAS—PART II. *Gas J.* (British) **257**, 95-96, 99-100 (1949) *January* 12.

This part of the series is devoted to a discussion of the principles of combustion, characteristics of various fuels, types of burners, air/gas mixing equipment and furnaces employed in the industrial application of gas.

E. F. Davis

Dickinson, F. COMMERCIAL AND INDUSTRIAL UTILIZATION OF GAS—PART III. *Gas J.* (British) **257**, 143-146, 149-150 (1949) *January* 19.

The principles of heat transfer are explained and methods for the design of both low and high temperature furnaces are given. Some discussion is given to the recovery of waste heat from high temperature furnaces.

E. F. Davis

Dickinson, F. COMMERCIAL AND INDUSTRIAL UTILIZATION OF GAS. PART IV. *Gas J.* (British) **257**, 195-196, 201 (1949) *January* 26.

This part of the series is given to a discussion of liquid heating application, lead and lead alloy heating, gas engines and other general applications. A chart is given for the approximate temperatures required for various heating operations.

E. F. Davis

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Strickland-Constable, R. F. KINETICS AND MECHANISM OF THE OXIDATION OF CARBON. p. 55

4. CARBONIZATION AND GASIFICATION

Carbonization Pressures

Foxwell, G. E. PRESSURES DEVELOPED DURING CARBONIZATION. *Coke & Gas* (British) **11**, 7-13 (1949) *January*.

The author critically reviews a report given to the British Coke Research Association, covering two years work with the Russell test oven at their Pontypridd station. Of 75 coals tested, 48 were from South Wales, 11 from Durham and the others from Kent, Bristol, Somerset, South and West Yorkshire, and the U.S.A. Existing practice has been confirmed as to the dominant effects of bulk density, blending, oven width and flue temperature upon pressure development in the oven. However, 50 tests on 7 coals failed to disclose any effect due to rate of heating at temps of 1000° to 1350°C leading the author to doubt the Russell oven results because of the high (1.25 to 2 inches per hour) heating rates used as compared with industrial rates of ½ to 1 inch per hour. The interpretation of the Russell oven results is still unsettled, since the deformation resistance of a hot oven-wall, as yet unknown, also involves the resistance to movement of the adjacent ovens and charges. Russell's maximum pressure limit of 2 lb per sq inch, also adopted by the British Coke Research Association, is felt to be too restrictive, and possibly wasteful of scarce coking coals, in the light of the empirical nature of heating rate and bulk density specifications. Conditions might be brought closer to the practical by modifying the test oven, which might

then yield useful indications if these were correlated with results on coals known to be dangerous in practice.

O. P. Brysch

Coal Cleaning

Gandrud, B. W. and Riley, H. L. A COMBINATION CLEANING AND DEWATERING PROCESS FOR TREATING FINE SIZES OF COAL. *U. S. Bureau of Mines Report of Investigations* **4306** (1948) *July.*

A process is under investigation for the dewatering of minus 10 mesh washings by a combination of kerosene flotation and extrusion by an auger. Kerosene mixed with a small quantity of frother (alcohol or pine oil) in a ratio of about 10 to 1 causes the floated material to agglomerate and results in only slight froth formation. The agglomerated, floated material is of such nature that it can easily be skimmed from the surface of the liquid and pressed practically free of water by extrusion through a rotating screw.

C. Von Fredersdorff

Coal Extraction

Dryden, I. G. C. EXTRACTION OF BRIGHT COALS BY ANHYDROUS ETHYLENE DIAMINE. *Nature* (British) **162**, 959-960 (1948) *December* 18.

Ethylene diamine is quite similar to pyridine, but more rapid and in some respects more powerful, as a solvent for coals. Solubility of coal decreases with increase in rank. (below 85% C, solubility is 35 to 40%; above 88% C, 1 to 5%). Like pyridine, moisture above 1% retards the action; also both residue and extract contain irreversibly absorbed diamine.

O. P. Brysch

Coal–Methyl Alcohol Interaction

Dresel, E. M., Griffith, M. and Hirst, W. THE FREE AND TOTAL ENERGIES OF INTERACTION OF COALS WITH METHYL ALCOHOL. *Trans. Faraday Soc.* (British) **44**, 992-1001 (1948) *December.*

Free and total energies of interaction at saturation may be calculated by the integrated Gibbs-Duhem equation from pairs of sorption isotherms at different temperatures. An explanation is offered for hysteresis effects. The low pressure value for methanol heat of adsorption on a high-rank South Wales coal (3100 cal/mole) agrees well with reported values (3200) for methanol on charcoal. Lower rank (higher oxygen) coals gave somewhat higher values. Calculated values are compared with those of heats of immersional wetting as determined calorimetrically.

O. P. Brysch

Coal Solubility

Berkowitz, N. SOLUBILITY OF BITUMINOUS COAL IN ALCOHOLIC POTASH. *Nature* (British) **162**, 960-961 (1948) *December* 18.

Alcoholic potash has been found to dissolve appreciable amounts of certain British coals. An 82.5% C—5.1% H coal was 20% dissolved; also its gamma-fraction was 100% soluble, its beta-fraction about 50%, and alpha-fraction slightly soluble. A South Wales coking coal of 89.7% C—5.0% H was only 5% soluble, indicating that increasing rank would give decreasing solubility. The extracted "humic" material precipitated by acid had a higher O content.

O. P. Brysch

Coal Tar

Green, S. J. and Ward, S. G. THE INSOLUBLE MATTER OF COAL TAR. I. INTRODUCTION. II. PRELIMINARY WORK ON FREE CARBON. *J. Soc. Chem. Ind.* (British) **67**, 422-426 (1948) *November.*

The authors review the earlier work on nature and determination of the insoluble constituents

of coal tar. This and later articles will describe their current examination of: (1) chemical nature; (2) physical condition of formation and existence; (3) isolation; and (4) inorganic matter content of the constituents. Preliminary work on horizontal and vertical retort tars indicated that the latter progressively increased in free carbon closely resembling coal tar resins after extended storage. Increased temperature produced (1) a reversible solution effect, but (2) above 150° an increasing formation of insolubles, probably from the benzene-soluble resins.

O. P. Brysch

Coke Ovens

Keeling, W. O. METHOD OF HEATING COKING RETORT OVENS WITH ENRICHED MIXTURES OF FUEL GAS. U. S. 2,458,515 (1949) January 11.

For coke ovens requiring a *non-regeneratively-preheated fuel gas for heating*, the inventor proposes to produce vapors rich in five-to-seven-carbon atom hydrocarbons by fractional distillation of natural gasolines at the oven-site, then to introduce these vapors immediately into a low-calorific value carrier-gas, such as producer gas blast-furnace gas, or combustion gases, in amounts sufficient to provide effective calorific value but insufficient to raise the dewpoint temperature of the fuel-gas mixture above that of the distribution system, then immediately delivering such fuel-gas mixture, without preheating, to the coke oven flues for subsequent combustion, thereby avoiding the use of coke-oven gas for oven heating.

O. P. Brysch

Wardner, W. C. HIGHER GAS PRODUCTION FROM COKE OVEN PLANTS. *Am. Gas Assoc. Monthly* 30, 30-31, 36 (1948) *October.*

Although the coke oven plant does not readily lend itself to wide variations in oven gas production without seriously affecting the quantity and quality of coke, tar and light oil yields, a number of procedures can be followed to increase the rate of gas production for peak load purposes, namely: (1) increasing coal throughput by decreasing coking time; (2) decreasing intensity of light oil stripping or closing down light oil plant entirely; (3) adding oil to coal up to a ratio of 5 gal/ton; (4) making oil gas in unserviceable coke ovens; (5) controlling bulk density either by oil addition, degree of pulverization of the coal or a combination of the two; (6) underfiring with oven gas mixtures or substitute fuels; (7) diluting and re-enriching coke oven gas with producer and natural gas respectively; (8) substituting water gas for producer gas as a coke oven gas diluent; (9) enriching oven gas with butane-and propane-air mixtures and (10 varying the type of coal to be carbonized, such as the use of cannel coal.

C. Von Fredersdorff

Distribution

Bell, F. CONTROL OF GAS DISTRIBUTION SYSTEMS. *Gas Times* (British) 58, 102, 104-105 (1949) *January* 28.

A description of a centrally controlled gas distribution system with an explanation of its operation is given.

E. F. Davis

Simpson, A. D., Jr. MITIGATION OF CORROSION ON CITY GAS DISTRIBUTION SYSTEMS. *Corrosion* 5, 59-69 (1949) *February.*

This paper presents the experiences of a large distribution system with cathodic protection in the mitigation of corrosion. Illustrated examples are presented of zinc and magnesium anode installations. The difficulties involved in insulating the pipe against underground contacts, insulating meters, and insulating pipeline fittings are discussed. A method of testing insulated fittings by the use of pipe line locators is described. A continuous record is made of the pipe-to-soil potential in order to insure proper protection.

B. E. Hunt

Retlaw, N. SIMPLE PRESSURE REGULATOR FOR GAS. *Gas World* (British) 130, 165 (1949) *January* 22.

A description of a shop-made low pressure gas regulator that can be constructed with little

expense and yet will give service comparable to the more expensive motor operated valves is given.

E. F. Davis

Heat Balance

Mason, J. B. M. and Clegg, L. HEAT BALANCE IN PRACTICE. *J. Inst. Fuel* (British) 22, 85-93 (1948) *December.*

The authors recommend that for any plant the "Specific Fuel Consumption" based on measurements of power consumption be determined. In order to improve the efficiency of utilization of power, an "Economic Fuel Target" should be prescribed, based on practical modifications of the present methods of operation. Practical illustrations of the procedure are given for the wool and magnesium industry in which the "Specific Fuel Consumption" and "Economic Fuel Target" are calculated by heat balances.

C. Von Fredersdorff

Holders

Ravald, L. A. THE PRESERVATION OF GASWORK STRUCTURES BY PAINT. *Gas World* (British) 130, 71-75 (1949) *January* 8.

The proper preparation of an iron or steel surface before the application of a paint is stressed. The failure of paint coatings on water sealed gas holders is discussed in some detail. Various procedures are outlined for applying undercoats and finish coats to metal surfaces including surfaces which are permanently damp.

B. E. Hunt

Oxygen Production

VanDyke, B. H. ELLIOTT OXYGEN SYSTEM. HOW IT WORKS . . . DESCRIPTION OF CYCLE. *Petroleum Refiner* 27, 540-544 (1948) *October.*

The Elliott system represents an atmospheric pressure air distillation process incorporating specially designed heat exchangers and other features resulting in a high degree of safety and operating flexibility. Air compressed to 22 psia by a single stage blower is cooled, cleaned and dried by water scrubbing, refrigeration, and dehumidification in an activated drier. Removal of final traces of CO_2 and water vapor and cooling to approximately minus 310°F is achieved by heat exchange with nitrogen in an indirect heat exchanger constructed of standardized copper fin sections. Impurities deposited in the heat exchanger are removed by purging each exchanger bank according to a fixed time cycle (4 hrs). The main distilling column yields 95% O_2 and 99.5% N_2 while a small quantity of 99.5% O_2 can be obtained from a high purity column located below the reboiler section of the main column. The supplemental high purity O_2 is produced without increasing the energy requirements per unit weight. Dangerous concentrations of acetylene are prevented by removal of this constituent (1) in part by freezing out in the clean up heat exchanger and (2) by silica gel adsorption in an accumulator located in the cooled air line entering the main column. Further engineering details, advantages and a a comparison with the Linde-Frankel oxygen unit are given.

C. Von Fredersdorff

Peak Load

Pettyjohn, E. S. MEETING THE PEAK LOADS OF MANUFACTURED GAS—PART I. *Gas Age* 103, 15, 19, 64 (1949) *January* 20.

The development of gas-making methods is traced, including coal carbonization, generation of carburetted water gas and oil gasification. The impact of the space heating demand upon gas production, storage and distribution facilities is analyzed. A bibliography of 67 references implements the discussion.

C. H. Riesz

Pulverized Coal Firing

PULVERIZED COAL CIRCULATING SYSTEM—LARGEST EVER BUILT—SUCCESSFULLY FIRES THREE ROTARY KILNS. *Ind. Heating* 15, 2094, 2096 (1948) *December.*

This largest capacity pulverized coal firing system has just been put into operation by the

Universal Atlas Cement Company at Independence, Kansas. A continuous loop of piping 275 feet long circulates the coal-air mixture continuously from a single pulverizer to four cement kilns. Mill capacity is 18,250 lb coal per hr at 80% minus 200-mesh, which suffices for 3 kilns at once, any surplus being returned to the pulverizer exhaust fan. This system eliminates storage of pulverized coal and is valuable in plants where several furnaces widely separated are fired.

O. P. Brysch

Purification

Denig, F. GAS PURIFICATION PROCESS. U. S. 2,458,505 (1949) January 11.

To the known hot-vacuum actification process for removal and recovery of hydrogen sulfide and hydrogen cyanide from coke oven gas, wherein the fouled alkali-metal carbonate solution is actified by heating it under reduced pressure to vaporize water and the acidic impurities, the inventor proposes to scrub the vaporized water and impurities with a wash oil heated to prevent condensation of water, and thereby remove naphthalene vapor which would deposit in and obstruct later stages of separation of the water, hydrogen sulfide and hydrogen cyanide.

O. P. Brysch

Dent, F. J., Moignard, M. A., Buckley, J. W. A., Davis, W. D. and Tantram, A. D. S. THE HARDENING OF OXIDE IN PURIFIERS. Gas Research Board Communication GRB 43.

This report describes the first part of an investigation of the hardening of oxide and the development of back pressure in box purifiers. Examination of a variety of fresh and caked oxides from normal plant operation, large scale tests, and laboratory investigation of the more fundamental aspects of the causes of caking were carried out. Evidence collected to date indicates that purifier performance is dependent upon: (1) using an oxide charge of low density; (2) avoiding the deposition of tar on the oxide; (3) securing even distribution of sulfur through the oxide; (4) keeping moisture content of spent oxide at 10% or higher; and (5) avoiding too long an exposure of oxide in the box. Further study to evaluate the effects of the polymerization of unsaturated hydrocarbons, the amount and point of admission of air added for purification, and the formation and behavior of water-soluble salts added to influence activity is planned.

H. Hakewill

Refractories

Chapman, H. E. FUTURE OF REFRACTORIES IN THE GAS INDUSTRY. *Gas World* (British) **130**, 106-111 (1949) *January* 15.

A discussion is presented of the refractories commonly used in the gas industry. These include silica, silica-alumina, magnesite, dolomite, chrome, chrome-magnesite, forsterite and silicon carbide. Phase diagrams are given for the silica-alumina and the silica-iron oxide system. Observations are presented on the appearance of various types of refractories after they have been exposed to severe service conditions.

W. J. Merwin

Solid Fuel Analysis

Edwards, A. H. THE ANALYSIS AND TESTING OF SOLID FUEL. PART III. CARBONIZATION PETROLOGY, REACTIVITY, ETC. *Bull Brit. Coal Utilization Research Assoc.* **12**, 353-360 (1948) *October.*

This third and final part of the series opens with comments upon eleven references to swelling and caking index tests of coals. The correlation of these tests with practical coke making remains controversial for the most part. Carbonization tests, which include seventeen references on plastic properties, expansion and pressure characteristics, and the B.M.-A.G.A. test are mentioned. Eleven references to ash fusion tests and their relationship to clinkering control problems are reviewed; coal petrology studies of three authors are discussed. Seven papers are mentioned which deal with reactivity and burning tests. In reviewing four papers on micro-analytical technique, the authors indicate that it is useful chiefly as a special research tool. Standardization of analytical techniques as presented in nine references, and analytical data on various national coal re-

sources from six references are reviewed. Eight references on general miscellaneous tests of fuels such as density, porosity, and size analysis are mentioned. The entire three-installment review is an excellent guide to 166 important contributions on testing.

O. P. Brysch

Vertical Retorts

Hubbard, W. S. IMPROVING THE GAS OUTPUT OF EXISTING VERTICAL RETORT INSTALLATIONS. *Gas Times* (British) 58, 31 (1949) *January* 14.

Increased gas yields are obtained from both vertical and horizontal retorts by proper maintenance and close regulation of the charging procedure and rate of coal throughput as affected by the type and size of coal carbonized. Steam admitted to continuous vertical retorts is held to a minimum amount consistent with temperature conditions at the bottom of the retort, resulting in a gas of high calorific value. A declared heating value of 450 Btu/cu ft is achieved by producer gas dilution.

C. Von Fredersdorff

Water Gas Operation

Dashiell, P. T. DEVELOPMENTS AND TRENDS IN WATER GAS OPERATION. *Gas* 25, 37-38 (1949) *January*.

Improvements in the operating procedure of present water gas sets and in the construction of newly installed sets have resulted in a marked increase in thermal capacity. A particular 9 ft diameter set with mechanical grate and center cone blast admission was operated at the high rate of 10,119 Mcf 529 Btu carburetted water gas per 22.5 hrs running time per day, yielding 53,000 therms/24 hrs and requiring a blast rate of 20,000 cfm. At blast rates in excess of 20,000 cfm difficulties occurred due to a tendency to lift the fuel bed and blow over small amounts of coke into the carburettor. It is impossible at present to predict the ultimate capacity both volumetrically and thermally of carburetted gas sets, principally because the operation of each installation is governed by quality of fuel at hand, shell diameter, and auxiliary capacity. A recent trend in the carburetted water gas industry has been the increasing availability and use of natural gas as a water gas enrichment substitute for oil carburetion.

C. Von Fredersdorff

The following article, which has not been abstracted, is called to your attention:

CONTINUOUS CARBONIZATION AND GASIFICATION EXPERIMENTS SHOW PROMISE FOR GAS INDUSTRY. *Gas* 25, 27-29 (1949) *February*.

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Cassingham, J. L. HOW TO FIND BURIED LINES WITH PIPE LOCATORS. p. 49

Dixon, O. K. WELDING METHODS AND EQUIPMENT FOR GAS MAINS AND SERVICES. p. 49

Hahn, J. F. LOCATION AND REMOVAL OF STOPPAGE IN MAINS. p. 49

Gibson, R. STORY OF GAS CHANGEOVER. p. 38

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Carbon Black

Stokes, C. A. and Dannenberg, E. M. CARBON BLACKS. *Ind. Eng. Chem.* **41**, 381-389 (1949) *February.*

Furnace blacks which are as effective as channel blacks for reinforcing rubber are now available. However, the electrical conductivity of furnace black is 100,000 times that of the channel black, and leads to scorch.

J. D. Parent

Chemicals from Natural Gas

Hightower, J. V. ORGANICS FROM NATURAL GAS. *Chem. Eng.* **56**, 92-94, 132-135 (1949) *January.*

The McCarthy Chemical Company plant at Winnie, Texas, is designed to process 100 Mcf per day of natural gas to produce methyl alcohol, formaldehyde and acetaldehyde by oxidation methods. The plant is described briefly and a flow sheet included.

C. H. Riesz

Compressors

Armstrong, W. W. MORE POWER FOR GAS COMPRESSING. *Heating, Piping & Air Conditioning* **21**, 93-94 (1949) *February;* HOPE NATURAL COMPLETES NEW POWER GENERATING STATION. *Gas Age* **103**, 28-29 (1949) *February* 3.

A very brief description is given of new power equipment for the Hastings Compressor stations of the Hope Natural Gas Company.

J. D. Parent

Hall, O. D. HUGOTON STATION DELIVERS 100 MMcf DAILY. *Gas* **25**, 43-44 (1949) *February.*

Cities Service Gas Company has recently completed a new 17,600 HP compressor station near Ulysses, Kansas at a cost of about $5,000,000. Intake pressure is 260 psig and discharge pressure is 90 psi. Eleven type 26 Cooper Bessemer units are employed. Pulsation dampening equipment is used on both suction and discharge lines. A dehydration plant of the activated bauxite type is used and consists of four split-flow towers 7 ft in diameter and 47 ft high. The 182 mile 26 inch line from Hugoton field to Kansas City has also been completed, making 100 MM/day of gas available. Other construction will raise this figure to 370 MM/day. Up to this point the capacity of the system has been 630 MM/day.

J. D. Parent

Janzen, J. J. COMPRESSORS IN THE NATURAL-GASOLINE INDUSTRY. *Compressed Air* **54**, 12-15 (1949) *January.*

The evolution of natural gas compressors from steam-driven units of 1898 to those of the present powered by V-type gas engines is traced in this article. Some of the common causes of compressor troubles are mentioned and methods for avoiding them are discussed.

J. C. Lane

Murphy, E. F. NATURAL FREQUENCIES OF COMPRESSOR AND ENGINE MANIFOLDS. *Calif. Oil World* **42**, 3, 7, 9, 11, 13, 15, 17 (1949) *February, 1st issue.*

Operation of reciprocating compressors is accompanied by such disturbances as noise and hunting. These appear to be due to resonance between natural frequencies of the piping and the fundamental or harmonic of the pressure wave attending alternating suction and discharge. Correction of these difficulties with full scale equipment is costly. A laboratory study of the problem using electric analogs and employing a network calculator is reported and it is found that the natural frequency of the piping system can be predicted. The author concludes that indiscriminate addition of receiver volume may be dangerous and that usage of an orifice may be dangerous. An impedance-capacitance filter comparable to a low loss muffler can be easily designed with the aid of the equipment described.

J. D. Parent

Murray, E. S. T. G. T. STATIONS EQUIPPED WITH 1,600-HP FOUR CYCLE COMPRESSOR UNITS. *Oil Gas J.* **47**, 70, 72, 76, 80 (1949) *February* 10.

In connection with the expansion of capacity of the Tennessee Gas and Transmission Company's line three new stations have been built which are equipped with horizontal 1,600 HP, 4 cycle compressors. The program of expansion included building a 26 inch loop line from Agua Dulce, Texas to Cornwall, West Virginia and increasing the compressor horsepower from 110,000 to 220,000. Compressor stations are at 85 mile intervals. Present capacity is 600 MM per day. The horizontal units were used in three stations because of their great size; it was felt that the high initial cost would be more than offset by increased operating economy. Some installation details are presented.

J. D. Parent

Conservation

Fancher, G. TWO MAJOR FACTORS PROMOTING CONSERVATION OF NATURAL GAS: SECONDARY RECOVERY. *Gas* **25**, 38, 40-42 (1949) *February*.

The author calls attention to the fact that secondary recovery differs essentially in type from primary methods of production, and is not necessarily a subsequent step in production. If the reservoir is not greatly depleted when secondary recovery is initiated, the procedure is called pressure maintenance; whereas if it has been largely depleted the procedure is called repressuring if gas is used, or water flooding if water is used. Good production practice frequently dictates the orderly withdrawal of oil in accordance with the type and effectiveness of natural driving forces accompanied by injection of the stripped gas produced. Unitization is, of course, necessary. A summary of numerous examples of secondary recovery and the anticipated benefits is given.

J. D. Parent

Wagner, H. J. TWO MAJOR FACTORS PROMOTING CONSERVATION OF NATURAL GAS: UNDERGROUND STORAGE. *Gas* **25**, 39-40 (1949) *February*.

Underground storage in the Appalachian region has led to a saving of billions of cu ft of locally produced gas, and has provided a market for larger volumes of southwestern gas. At present this area has 134 billion cu ft of gas with an allowable withdrawal rate of 1 billion cu ft per day and an anticipated seasonal withdrawal of 56 billion cu ft. These figures will be increased shortly. The average well in the area produces less than 50 MM per day and to shut these in or hold back production by high line pressure would result in waste. This is prevented by the use of storage pores.

J. D. Parent

Distribution

Cassingham, J. L. HOW TO FIND BURIED LINES WITH PIPE LOCATORS. *Gas* **25**, 42-43 (1949) *January*.

A method is described for locating pipe with the Goldak model 87 pipe locator. Much greater accuracy is claimed for the model than for conventional types.

W. G. Bair

Dixon, O. K. WELDING METHODS AND EQUIPMENT FOR GAS MAINS AND SERVICES. *Gas Age* **103**, 31-34, 60, 62 (1949) *January* 20.

A description is presented of a truck which has been modified for welding service on mains and service installations. Examples are given of problems involved in this type of work where welding methods may be used to an advantage.

B. E. Hunt

Hahn, J. F. LOCATION AND REMOVAL OF STOPPAGES IN MAINS. *Gas Age* **103**, 26-27, 52-54 (1949) *February* 3.

Pressure surveys are used to locate stoppages. Types of stoppages encountered and means of removal used by Milwaukee Gas Light Company are explained.

J. D. Parent

Dry Ice Manufacture

Gard, C. D. DRY ICE MANUFACTURED FROM CO_2 EXTRACTED FROM NATURAL GAS. *Petroleum Refiner* **28**, 117-122 (1949) *February*.

See *Gas Abstracts* **5**, 23 (1949) *February* for abstract.

LP Gas

Mattocks, E. O. LP-GAS SAFETY REQUIREMENTS. *Am. Gas Assoc. Monthly* **31**, 30-33, 48 (1949) *February*.

See *Gas Abstracts* **5**, 6 (1949) *January* for abstract.

Meters

Lindsey, D. H. FIELD TESTING AND MAINTENANCE OF LARGE CAPACITY DISPLACEMENT METERS. *Am. Gas J.* **170**, 34-35 (1949) *January*.

The frequency of testing meters depends on local regulations, the cast, and the terms of the sales contract. The methods of testing large capacity meters are: (1) bell prover; (2) test meter; (3) low pressure flow prover; and (4) critical flow prover. With proper precautions all four methods will give the same proof. Meters should be tested at three or more rates of flow. The advantages and disadvantages of each method of testing are discussed.

W. J. Merwin

Spink, L. K. ACCURATE WIDE RANGE METERING OF NATURAL GAS. *Petroleum Engr.* **21**, D19-20, 22-23 (1949) *February*.

See *Gas Abstracts* **4**, 104 (1948) *May* for abstract.

Pipe Lines

Rohman, A. SELF-SUPPORTING PIPE LINE STREAM CROSSING. *Gas Age* **103**, 25 (1949) *February* 3.

Southern California Gas Company has made a novel river crossing spanning the Alamo river. The line pipe is welded into an arch and is self-supporting. The 10 inch line is split into two six inch lines at each end in a Y shape in order to give resistance to high winds.

J. D. Parent

Production

MacRoberts, D. T. EFFECTS OF TRANSIENT CONDITIONS IN GAS RESERVOIRS. *J. Petroleum Technol.* **1**, (Trans. Sec.) 36-38 (1949) *February*.

The vicinity of a well is a scene of complex disturbances, which travel rather slowly and may greatly affect back pressure tests. The Monroe field contains areas having transient time of the order of years giving rise to the anomaly of effective depletion in some parts and virgin pressures in others. It has long been noted that in some instances different results have been obtained in back pressure tests if the pressure is successively decreased rather than increased. This is thought to be due to transient disturbances of pressure. Although pseudo-stabilization may be achieved in short time incorrect back pressure data may be obtained.

J. D. Parent

Abstractor's Note: If the author's analysis is correct it is of great consequence to all producers.

Purcell, W. R. CAPILLARY PRESSURES—THEIR MEASUREMENT USING MERCURY AND THE CALCULATION OF PERMEABILITY THEREFROM. *J. Petroleum Technol.* **1**, (Trans. Sec.) 39-42, 43-48 (1949) *February*.

An apparatus is described whereby capillary pressure curves for porous media may be determined by a technique that involves forcing mercury under pressure into the evacuated pores of solids. The data so obtained are compared with capillary pressure curves determined by the porous diaphragm method, and the advantages of the mercury injection method are stated. Based upon a simplified working hypothesis, an equation is derived to show the relationship of the permeability of a porous medium to its porosity and capillary pressure

curve, and experimental data are presented to support its validity. A procedure is outlined whereby an estimate of the permeability of drill cuttings may be made with sufficient accuracy to meet most engineering requirements.

Author's abstract

Reviewer's Note: Capillary pressures have received considerable attention in estimating connate water and reservoir behavior. A number of useful literature references are given.

J. D. Parent

Propane Recovery

Glendening, A. S. and Sanderson, C. F. SHORT CUT PROCESS DESIGN TO INCREASE PROPANE RECOVERY IN GASOLINE PLANTS. II. *Petroleum Processing* **4**, 153, 155-156, 158-160 (1949) *February.*

A short cut design method developed in the first installment is applied to a column for rich oil deethanizing.

J. D. Parent

Unitization

Bryant, F. S. SOME ASPECTS OF UNITIZATION — CALIFORNIA OIL AND GAS FIELDS. *J. Petroleum Technol.* **1**, (Sec. 1) 27-30 (1949) *February.*

Advantages and some problems in unitization are discussed. The advantage of unitization by statute is considered.

J. D. Parent

McCaslin, L. S., Jr. TWO OF WORLD'S LARGEST SEPARATION STATIONS INSTALLED IN GULF COAST FIELDS. *Oil Gas J.* **47**, 67-69, 103-104 (1949) *February* 10.

The Old Ocean field of Texas is the largest voluntarily unitized gas and oil field in the United States, producing 17,500 bbl. of oil and 350 MM of gas daily. Unitization was completely achieved in August, 1948. Facilities of the two original plants are now being revamped for greater efficiency. Flow sheets are given.

J. D. Parent

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Simpson, A. D., Jr. MITIGATION OF CORROSION ON CITY GAS DISTRIBUTION SYSTEMS. p. 44

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalysts

Maxted, E. B. and Walker, A. G. STUDIES IN THE DETOXIFICATION OF CATALYST POISONS. PART VIII. THIONAPHTHENE AND THE THIOPHTHENES. *J. Chem. Soc.* (British) **1948**, 1916-1919 (*November*).

The suppression or elimination of the poisoning effect of thionaphthene upon the catalytic activity of a platinum hydrogenation catalyst has been accomplished by converting this compound into a shielded non-toxic form (thionaphthane sulfone). The procedure for detoxification is similar to that described previously for thiophene (*Gas Abstracts* 3, 169, 1947). The detoxification of two isomers of thiophthene was also studied.

C. H. Riesz

Fischer-Tropsch Synthesis

Anderson, R. B., Hall, W. K., Krieg, A. and Seligman, B. STUDIES OF THE FISCHER-TROPSCH SYNTHESIS. V. ACTIVITIES AND SURFACE AREAS OF REDUCED AND CARBURIZED COBALT CATALYSTS. *J. Am. Chem. Soc.* **71**, 183-188 (1949) *January.*

During the Fischer-Tropsch synthesis of liquid hydrocarbons from carbon monoxide and hydrogen, the catalyst becomes covered heavily with a wax-like hydrocarbon deposit (density, 0.90). Treatment with hydrogen at 392° F removed 90% of this deposit, while the last 10% required a temperature of 752°F. In atmospheric synthesis, the catalytic activity was related to the filling of the catalyst pores with absorbed hydrocarbon deposit, complete regeneration being possible through removal by hydrogeneration or solvent treatment. In pressure synthesis (7.8 atmospheres pressure), the pores

of the catalyst were apparently filled with hydrocarbons at all times, constant activity for long periods of time being observed. Decrease in the accessibility of catalyst surface due to wax or other causes resulted in an increase in the fraction of product appearing as methane and other light hydrocarbons. The presence of bulk carbide in the catalyst produced a marked decrease in activity while "free" carbon did not affect activity appreciably; in both cases, the product distribution was shifted toward the formation of a larger proportion of light hydrocarbons.

C. H. Riesz

Heinemann, F. THE FISCHER-TROPSCH HYDROCARBON SYNTHESIS...ITS FIRST DEVELOPMENT. *Petroleum Refiner* 28, 126-127 (1949) *January.*

An interesting account of the early history of the Fischer-Tropsch process is presented. The process was discovered while prospecting fundamental research sponsored by the German coal industry. The German patent office rejected the novelty of the first invention application on the basis of anticipation by one of Fischer's publications. I.G. also opposed the application, an action permitted under German patent law. After long litigation and appeal, the basic patent was accepted.

C. H. Riesz

Hofer, L. J. E., Cohn, E. M. and Peebles, W. C. MODIFICATIONS OF THE CARBIDE, Fe_2C, THEIR PROPERTIES AND IDENTIFICATION. *J. Am. Chem. Soc.* 71, 189-195 (1949) *January.*

Thermomagnetic and X-ray diffraction studies confirm the existence of two carbides of iron with the formula, Fe_2C, and having Curie points at 477°F and 716°F. The latter form has the iron atoms arranged in hexagonal structure and is unstable above about 572°F decomposing into the so-called Hägg carbide. The Hägg carbide in turn decomposes at about 1022°F in one hour into cementite (Fe_3C) and free carbon. The presence of all three carbide forms in Fischer-Tropsch iron catalysts was demonstrated making possible a general unification of data presented in the literature.

C. H. Riesz

Houdriflow Catalytic Cracking

SIMPLICITY OF PROCESS AND LOW INVESTMENT COST STRESSED. *Petroleum Refiner* 28, 110-112 (1949) *January.*

A schematic flow diagram and a brief description of the Houdriflow catalytic cracking process is presented. The chief differences between this and the TCC process are as follows: (1) the catalyst particles are transported by a gas stream instead of by a mechanical conveyor; (2) higher catalyst/oil ratios are obtainable thereby permitting operation with stocks from zero to 100% vaporized; (3) the carbon burn-off section is simplified in that one or two burning zones are sufficient instead of seven to ten used in TCC; and (4) the reactor is superimposed on the regenerator.

W. J. Merwin

Mercaptan Extraction from Gasoline

Fuqua, F. D. IMPROVE EFFICIENCY IN MERCAPTAN EXTRACTION USING CASCADE-TYPE FRACTIONATING TRAYS. *Petroleum Processing* 3, 1050-1051 (1948) *November.*

A cascade type vapor-liquid fractionating tray has been applied very successfully to liquid-liquid extraction. Heavy liquid leaving a tray cascades down over a series of troughs and through a perforated vertical baffle at the end of each trough. The less dense liquid passes up through the trough, thus contacting the heavier liquid moving across the path of the former. In studying efficiency and capacity, gasoline was treated with tannin solution. By comparison with laboratory extraction the cascade tower was found to have about twice the efficiency of that of a bubble plate column. Maximum linear velocity was about 60% greater than that attained in the plant bubble tower. A saving in initial cost of about 52% could be realized by installing this type of column instead of a tower packed with carbon rings.

C. L. Tsaros

Naphtha Reforming

Tighe, H. F. METHOD FOR CORRELATING THERMAL REFORMING YIELD DATA WITH OPERATING CONDITIONS. *Petroleum Processing* **3**, 986-988, 990-992 (1948) *October.*

A method has been developed for correlating reforming yields with operating conditions when the charge stock is straight run naphtha. The correlation partially considers the variation in cracking rate between the various components of the naphtha and expresses the reforming number, which is 100 times the fraction cracked, as a function of the fraction of paraffins in the charged stock, the reaction velocity constant at the mean effective reaction temperature, and the contact time. 900°F is assumed as the base temperature for cracking. The reaction velocity constant is determined from a plot of temperature vs. cracking coil volume, by assuming it is doubled for every 20°F rise in temperature. The reaction K used is the ratio of K at T divided by K at 900°F. The residence time is determined from the same plot. It was assumed that change of reaction K with temperature was the same for all paraffins and the same for non paraffins. The ratio of K (non paraffins) to K (paraffins) was found to be 0.4.

C. L. Tsaros

Petroleum Formation

Brooks, B. T. THE ORIGIN OF PETROLEUM IN THE LIGHT OF RECENT RESEARCH. *Calif. Oil World* **42**, 3-5, 7, 9, 11, 13 (1949) *January, 2nd issue.*

The formation of petroleum appears to have occurred in two stages; first, the alteration of organic matter in marine sediments to material containing mostly carbon and hydrogen, but few hydrocarbons; second, the formation of a large number of hydrocarbons of various types by low temperature processes catalyzed by mineral matter. The action of bacteria, high pressure or emanations from radio-active substances are considered to be unimportant. Fatty oils appear to be the most likely source of petroleums with proteins and cellulose probably also contributing.

J. D. Parent

Synthetic Liquid Fuels Annual Report

The annual report of the Secretary of the Interior covers the operations of the Bureau of Mines during the past year. Three separate publications, fairly detailed and with many photographs and drawings, comprise the 1948 report.

CHR

SYNTHETIC LIQUID FUELS 1948 ANNUAL REPORT OF THE SECRETARY OF THE INTERIOR. PART I. OIL FROM COAL. U.S. Bureau of Mines Report of Investigations 4456 (1949) January.

The hydrogenation demonstration plant at Louisiana, Mo., is approximately 97% complete and by the end of 1949 results from preliminary operations will be available. Plant capacity is rated at 200 to 300 bbls. of oil per day. Construction of a gas synthesis demonstration plant (100 bbls per day) is approximately 20% complete. In this plant, pulverized coal is to be gasified with oxygen and superheated steam, the gas purified and converted into liquid fuels by a modification of the Fischer-Tropsch process. The laboratory work at the Bruceton, Pittsburgh and Morgantown, West Virginia Laboratories and underground gasification tests at Gorgas, Alabama, are also reviewed.

C. H. Riesz

SYNTHETIC LIQUID FUELS 1948 ANNUAL REPORT OF THE SECRETARY OF THE INTERIOR. PART II. OIL FROM OIL SHALE. U.S. Bureau of Mines Report of Investigations 4457 (1949) January.

Experimental mining research and a shale oil demonstration plant at Rifle, Colorado provide information on the technology of producing oil from shale. Laboratory and pilot plant studies were conducted at Laramie, Wyoming. The refining of shale oil presents considerable difficulties because of the presence of sulfur, nitrogen and oxygen compounds in the extracted shale oil.

C. H. Riesz

SYNTHETIC LIQUID FUELS 1948 ANNUAL REPORT OF THE SECRETARY OF THE INTERIOR. PART III. LIQUID FUELS FROM AGRICULTURAL RESIDUES. PART IV. SECONDARY RECOVERY AND PETROLEUM CHEMISTRY AND REFINING RESEARCH. U.S. Bureau of Mines Report of Investigations 4458 (1949) January.

An appropriation of $510,000 was transferred to the Department of Agriculture to study the production of alcohol and other liquid fuels from agricultural residues. A semiworks plant located at Peoria, Illinois, has hydrolyzed pentosans to pentose sugars, corncobs being used as the source of the pentosans. Other work in progress is also reviewed. Work on secondary recovery of petroleum from selected pools has been studied at various field offices. In cooperation with the American Petroleum Institute, the Bureau is synthesizing and studying sulfur compounds of the type found in petroleum.

C. H. Riesz

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Edmister, W. C. APPLICATIONS OF THERMODYNAMICS TO HYDROCARBON PROCESSING. PART XIV. LATENT HEATS OF VAPORIZATION. p. 55

7. ANALYTICAL METHODS AND TESTS

Gas Analyses Interpretation

Davey, W. J. G. INTERPRETATION OF GAS ANALYSES. *Gas World* (British) **130**, 148-155 (1949) *January* 22.

The calculation of calorific value, specific gravity, kinematic viscosity, total air requirements, ratio of calorific value to specific gravity, aeration test burner number, flow of gas through orifices absolute viscosity, flow of gas through mains, CO_2 and H_2O in undiluted products, excess air, and flue losses based on the composition of gas mixture is described. Tables of factors designed to simplify the computation of calorific value, specific gravity, and total air requirements from analytical results for composition are included. Sample calculations using analytical data on washed and unwashed coal gas from vertical retorts and on carburetted water gas are given to demonstrate the application of calculated properties of gaseous mixtures to the interpretation of gas analyses.

H. Hakewill

Specific Gravity Determination

Dawson, O. H. and Synder, J. A. LABORATORY PRACTICES FIND SPECIFIC GRAVITY OF GASES RAPIDLY WITH IMPROVED DESIGN IN GRAVITOMETERS. *Petroleum Processing* **4**, 54, 57 (1949) *January*.

Apparatus for the determination of specific gravity of gases based upon measurement, with an inclined tube water manometer, of the difference in static heads at the bottom of 35 ft high tubes containing air and gas, respectively, is described. Simplicity, accuracy and rapidity are claimed for the method. A few comparisons of results obtained for known gases with handbook values, and comparisons of results obtained for cracked gas with Anubis Gravitometer values are given to demonstrate that the deviation of the manometer method for specific gravity measurement is less than 1%.

H. Hakewill

Spectroscopy

Anderson, J. A., Jr. and Seyfried, W. D. DETERMINATION OF OXYGENATED AND OLEFIN COMPOUND TYPES BY INFRARED SPECTROSCOPY. *Anal. Chem.* **20**, 998-1006 (1948) *November*.

The application of infrared spectroscopy to the quantitative and semi-quantitative determination of the components of complex organic liquid systems is described. Of interest is the very small quantity of sample required.

S. Katz

8. GENERAL AND PHYSICAL CHEMISTRY

Azeotropes

Licht, W., Jr. and Denzler, C. G. AZEOTROPIC MIXTURES. *Chem. Eng. Progress* **44**, 627-638 (1948) *August*.

An experimental and theoretical study of pressure-temperature relationships of azeotropes has been made. Equations analogous to the Clapeyron equation have been found applicable to all types of azeotropes. The systems considered in the survey include three groups investigated by the authors and described here for the first time. These are n-propanol-water, n-propanol-benzene-water and ethanol-trichlorethylene-water. Experimental methods of investigating these systems are described.

S. Katz

Carbon Oxidation

Strickland-Constable, R. F. KINETICS AND MECHANISM OF THE OXIDATION OF CARBON. *Chem. & Ind.* (British) **1948**, 771-774 (*December* 4).

The work of the writer and others in this field has been critically surveyed. It is pointed out that low pressure studies in the past using an electrically heated filament probably gave rise to interfering glow discharges. It is stated that the reaction is probably first order between 900 and 2000°. A dual reaction mechanism is probably involved with a majority of the oxygen reacting directly with the surface to form CO_2 while a small fraction forms a stable surface complex. The discussion is extended to include H_2O and N_2O.

S. Katz

Critical Constants

Boas, A. CRITICAL CONSTANTS, DENSITY AND VISCOSITY. *Ind. Eng. Chem.* **40**, 2202-2203 (1948) *November*.

Application of the law of corresponding states to some equations relating physical properties permits the development of reduced equations which may be used to estimate critical constants. Viscosity and specific gravity lead to good correlations. Refractive index, vapor pressure, dielectric constant, etc. are less satisfactory.

S. Katz

Heat Capacity Equations

Spencer, H. M. EMPIRICAL HEAT CAPACITY EQUATIONS OF GASES AND GRAPHITE. *Ind. Eng. Chem.* **40**, 2152-2154 (1948) *November*.

Empirical heat capacity data for graphite and 117 gases including 17 paraffins, 39 olefins, 12 acetylenes, 20 alkylbenzenes, 10 cyclopentanes, 17 cyclohexanes and several organic and inorganic gases. Equations are of the forms

$$a + bT + cT^2,\ a + bT + cT^{-2},\ \text{and}$$
$$a + bT + cT^2 + dT^3.$$

In the last group, deviations from the two values are usually of the order of 0.10% and rarely exceed 0.50%.

S. Katz

Thermodynamics

Edmister, W. C. APPLICATIONS OF THERMODYNAMICS TO HYDROCARBON PROCESSING—PART XIV—LATENT HEATS OF VAPORIZATION. *Petroleum Refiner* **27**, 656-663 (1948) *December*.

Various methods of determining latent heats of vaporization of pure substances are examined critically. Two methods, one based on a comparison of the unknown with a known reference substance, and one employing compressibility terms are recommended. The application of the latter method to mixtures is described.

S. Katz

Abstractor's Note: The reader's attention is drawn to an error in the calculation of the example following equation 284.

Thermo-osmosis

Denbigh, K. G. THERMO-OSMOSIS OF GASES THROUGH A MEMBRANE. *Nature* (British) 163, 60 (1949) *January* 8.

A study has been made of the passage of gas through a membrane against a hydrostatic pressure due to a temperature gradient. The thermodynamic similarity of the process to thermal effusion and to the "fountain effect" in liquid Helium II is indicated.

S. Katz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Anderson, J. A., Jr. and Seyfried, W. D. DETERMINATION OF OXYGENATED AND OLEFIN COMPOUND TYPES BY INFRARED SPECTROSCOPY. p. 54

Audibert, E. The COMBUSTION OF METHANE/AIR MIXTURES. p. 39

Bridger, G. W. and Appleton, H. THE INHIBITION OF THE COMBUSTION OF CARBON AND CARBON MONOXIDE. p. 39

Dresel, E. M., Griffith, M. and Hirst, W. THE FREE AND TOTAL ENERGIES OF INTERACTION OF COALS WITH METHYL ALCOHOL. p. 43

Kaye, J. THERMODYNAMIC PROPERTIES OF GAS MIXTURES ENCOUNTERED IN GAS-TURBINE AND JET PROPULSION PROCESSES. p. 39

9. ORGANIC CHEMISTRY

Acetylene

Sittig, M. MODERN TECHNIQUES FOR THE PROCESSING OF ACETYLENE. *Petroleum Processing* 4, 23-26 (1949) *January.*

The production, handling and utilization of acetylene, mainly in Germany, is reviewed.

C. H. Riesz

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Spencer, N. M. EMPIRICAL HEAT CAPACITY EQUATIONS OF GASES AND GRAPHITE. p. 55

10. CHEMICAL ENGINEERING

Cover Plates

Lonngren, H. E. PRESSURE RATING OF FLAT, BOLTED-ON, CIRCULAR COVER PLATES. *Petroleum Refiner* 27, 654-655 (1948) *December.*

The author presents formulas which simplify the calculation of pressure ratings of flat cover plates for the case where the minimum bolt load is governed by the gasket yielding load and where it is governed by the sum of the gasket seating load and the hydrostatic end load.

W. J. Merwin

Dehydration

Williams, A. E. ACTIVATED ALUMINA. *Can. Chem. & Process Ind.* 33, 41-43 (1949) *January.*

The use of activated alumina for gas, liquid, and solid dehydration and as a catalyst or catalyst support is discussed. Gas drying to dew points of —70°C has been accomplished on a commercial scale with activated alumina. Drying operations with alumina are most effective at temperatures below 30°C. Activated alumina is chemically inert, non-corrosive, and can be repeatedly regenerated by heating to 230-250°C without deterioration of its adsorptive properties.

H. Hakewill

Fractionation

Bailey, R. V. and Coates, J. SIMPLIFIED MULTICOMPONENT FRACTIONATION CALCULATIONS. PART II. DISTRIBUTION OF SPLIT KEY COMPONENTS. *Petroleum Refiner* 28, 123-129 (1949) *February.*

The problem in multicomponent distillation of determining the correct distribution between the bottoms and overhead of components with volatilities intermediate between those of the key components has been handled in the past largely by trial and error. In this article methods of determining the distribution of these components, split key components, with a minimum of trial and error are presented. In Part I a simplified method of handling this problem at minimum reflux by means of the Underwood equations was presented. The limitations of the Underwood equations for the case of varying relative volatilities were pointed out. In the present article, Part II, a simplified method of applying the Colburn relation at minimum reflux to the determination of the distribution of split key components is presented. A study has been made of the distribution of split keys which will give the optimum number of trays at reflux ratios other than total and minimum. The distribution of split keys obtained at total reflux was found to give a minimum number of trays at all reflux ratios except those very close to the minimum.

Authors' abstract

Boyd, D. M., Jr. FRACTIONATION, INSTRUMENTATION AND CONTROL — PART II. *Petroleum Refiner* 27, 594-597 (1948) *November.*

Most of the continuous fractionation column control systems may be classified into (1) stripping section temperature control; (2) rectification section temperature control; and (3) material balance control. With the first type the temperature measuring element activates a valve regulating the amount of steam to the reboiler. With the second type the steam to the reboiler is constant and the temperature measuring element activates a valve which regulates the amount of reflux returned to the column. With material balance control there is a ratio flow controller on the bottoms product which is reset by changes in feed flow rate. This last type of control is recommended only when the other two types cannot be used.

W. J. Merwin

Tivy, V. V. St. L. AUTOMATIC CONTROL OF FRACTIONATING COLUMNS. *Petroleum Refiner* 27, 603-608 (1948) *November.*

See *Gas Abstracts* 5, 13 (1949) *January* for abstract.

High Pressure Flow

Ipatieff, V. N., Monroe, G. S. and Fisher, L. E. HIGH PRESSURE LABORATORY FLOW APPARATUS. *Ind. Eng. Chem.* 40, 2059-2062 (1948) *November.*

A furnace and reactor system are described for the study of flow systems on a laboratory scale at pressures to 13000 psi and temperatures up to 565°C.

S. Katz

Permeability

Muskat, M. SUMMARIZATION STATEMENT ON RELATIVE PERMEABILITY. *Oil Gas J.* 47, 121, 123 (1949) *February* 17.

It is possible to formulate equations for multiphase fluid flow through porous media on the basis of a generalized permeability concept, and provide a reasonably satisfactory theory of reservoir performance. The surface tensions of the various phases and hysteresis effects are very important factors. Gas saturation greatly affects gas permeability.

J. D. Parent

Pressure Vessel Design

Nelson, J. G. CALCULATION SHEETS FOR VESSEL DESIGN. *Petroleum Refiner* 27, 565-572 (1948) *November.*

The author presents a series of forms covering design calculations for pressure vessels accord-

ing to the ASME-UPV code. An example is worked out and derivation of formulae is presented.

W. J. Merwin

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bachman, C. H. THE PHYSICAL PRINCIPLES OF VACUUM MEASUREMENT AND Licht, W., Jr. and Denzler, C. G. AZEOTROP-

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Heat Exchangers

Toogood, G. D. HEAT EXCHANGERS. *Gas & Oil Power* (British) 43, 397-415 (1948) *December.*

In a rather comprehensive article the author presents some fundamental considerations on heat exchangers as applied to gas turbines. The main objective in using heat exchangers is to increase the thermal efficiency of the turbine. Theoretical aspects and practical considerations are presented.

W. J. Merwin

Instrumentation

Comstock, C. S. HOW GOOD INSTRUMENTATION CAN SAVE DOLLARS. PART II. *Chem. Ind.* 64, 44-46 (1949) *January.*

Good instrument planning starts with the piping and instrument diagram of a proposed process. After the process is in operation the functions of an instrument department are said to be: (1) procurement and training of personnel; (2) adjustment of instruments; (3) maintenance of instruments; (4) assisting of operators; (5) checking of instruments for accuracy; (6) interpretation of charts; (7) study, revision and improvement of control operations; (8) development of new instruments and applications. The author briefly discusses each of these topics.

W. J. Merwin

Webb, R. D. GADGETEERING THE VALVE POSITIONER. *Petroleum Processing* 4, 81-83 (1949) *January.*

The author presents diagrams showing unusual service applications for the valve stem positioner. These are as follows: (1) use of positioners to operate multiple valves in sequence with a single controller; (2) altering the positioner to make a valve pulse at high frequency; (3) use of positioner to transmit mechanical position to the control room; (4) use of the positioner as an interlock between valves; (5) use of the positioner to provide a low range piloting mechanism for a back pressure valve; (6) use as a selector relay; (7) use in conjunction with a liquid level controller to unload chlorine from tank cars.

W. J. Merwin

Vacuum Operation

Bachman, C. H. THE PHYSICAL PRINCIPLES OF VACUUM MEASUREMENT AND PRODUCTION. *Instruments* 22, 33-36 (1949) *January.*

The author discusses qualitatively the general principles of vacuum operation. Rotary and diffusion pumps and McLeod, Pirani, thermocouple and ionization gauges are described. Instrumentation to secure a controlled uniform reduced pressure is discussed.

S. Katz

The following article, which has not been abstracted, is called to your attention:

Nelson, W. L. COST-IMATING LOWER INSULATION PLATFORMS. *Oil Gas J.* 47, 101 (1949) *January* 13.

12. MATERIALS OF CONSTRUCTION

Corrosion

Alquist, F. N. A GEOGRAPHIC STUDY OF DEPOSITS AND CORROSION. *Corrosion* **5**, 45-53 (1949) *February.*

The compositions of water formed deposits have been studied extensively and found to be independent of their geographic location due to the water treatment practiced and to the effect of corrosion. Research methods are outlined to enable the operator to determine the extent of corrosion and deposition by industrial waters.

B. E. Hunt

Insulation

INSULATING OUTDOOR EQUIPMENT. *Petroleum Processing* **4**, 65, 67-68 (1949) *January.* Mineral wool, which is made from inorganic silicates, is favored as insulating material for outdoor equipment. This material is strong, light, easy to install and maintain, has a low thermal conductivity and is supplied in various forms. The techniques followed in applying insulation to pipes, ducts, flanges and valves is described.

W. J. Merwin

Refractories Symposium

The following six papers were originally presented at the High-Temperature Refractories Symposium held at the New Orleans Regional meeting of the American Institute of Chemical Engineers. The high temperature problem has been posed by the proposed use of tonnage oxygen for enrichment purposes.

Rochow, W. F. and Brashares, C. A. RECENT DEVELOPMENT IN REFRACTORIES AND THEIR APPLICATIONS. *Chem. Eng. Progress* **44**, 869-872 (1948) *November.*

Recent developments in silica, alumina-silica (high-alumina) and basic refractories are reviewed. Service temperatures in excess of 3000°F are stressed.

A. J. Rudnitzki

Whittemore, O. J., Jr. PURE OXIDE HEAVY REFRACTORIES. *Chem. Eng. Progress* **44**, 872-875 (1948) *November.*

The pure oxide refractories are characterized by freedom from fluxing impurities and include, in order of increasing cost, alumina, magnesia, zirconia, beryllia and thoria. Availability and reasonable cost have made alumina, magnesia and zirconia refractories commercially important and some of their properties are described.

A. J. Rudnitzki

Baldwin, W. J. ZIRCON AND ZIRCONIA REFRACTORIES. *Chem. Eng. Progress* **44**, 875-878 (1948) *November.*

The properties of zircon (zirconium silicate) and zirconia, and their application particularly in special refractory fields, are listed. These refractories are characterized by high melting point and chemical stability; resistance to the action of certain molten metals, acidic chemicals and slags and glasses; resistance to thermal shock, hardness and resistance to abrasion.

A. J. Rudnitzki

Geiger, C. F., Turner, A. A. and Stach, O. R. APPLICATIONS OF SUPER-REFRACTORIES MADE FROM ELECTRIC FURNACE PRODUCTS. *Chem. Eng. Progress* **44**, 933-936 (1948) *December.*

The physical properties of the bonded refractories made from silicon carbide, fused alumina, and synthetic mullite, and of the electrically fused cost refractories are tabulated. Typical applications depend not so much on refractoriness as on some unique property or combination of properties. Silicon carbide, for example, is particularly suitable for indirect heating because of its high thermal conductivity and high emissivity. Typical successful applications are cited.

A. J. Rudnitzki

Parker, L. and Foster, J. J. FIBROUS SILICA —A NEW ENGINEERING MATERIAL. *Chem. Eng. Progress* **44**, 937-942 (1948) *December.*

Fibrous silica (Refrasil) was developed as an insulating material for the tail pipes of jet-propelled aircraft. It is available in the form of

bulk fibers, batt, cloth, tape, sleeving and cordage. In industries other than aircraft, it may be economically used where (1) weight-saving is a factor; (2) ease of installation and removal is desired; and (3) the temperatures encountered are greater than 1000°F. Continued use at temperatures in excess of 2000°F is not recommended. Properties and indicated applications are described.

A. J. Rudnitzki

Remmey, G. B. NEW ALUMINA-SILICA REFRACTORIES. *Chem. Eng. Progress* **44**, 943-946 (1948) *December.*

Early researches have shown that mullite and corundum are the stable components of silica and alumina at temperatures above 3200°F. This suggested the development of mullite-bonded mullite bricks and corundum-bonded alumina bricks for super-refractory use. Along these lines, five new refractories have appeared since 1940. The properties of these new products are described and compared with the properties of older, well-known refractories.

A. J. Rudnitzki

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Chapman, H. E. FUTURE OF REFRACTORIES IN THE GAS INDUSTRY. p. 46

Ravald, L. A. THE PRESERVATION OF GAS-WORK STRUCTURES BY PAINT. p. 45

Simpson, H. D., Jr. MITIGATION OF CORROSION ON CITY GAS DISTRIBUTION SYSTEMS. p. 44

13. NEW BOOKS

Spectroscopy

Harrison, G. R., Lord, R. C. and Loofbourow, J. R. PRACTICAL SPECTROSCOPY. New York, Prentice-Hall, 1948.

The authors of "Practical Spectroscopy" undertake to present a handbook to permit workers in various fields of science to evaluate the applications of spectroscopy to their fields. Following a discussion of general principles and applications, a detailed description of prism and grating instruments is given including methods of testing and adjusting equipment. The theory of the origins of atomic and molecular spectra is followed by a section on experimental techniques. Absorption and emission spectroscopy, infrared, Raman and the vacuum ultraviolet are described with references to current commercial equipment. The book is concluded with a somewhat specialized section on interferometric measurements of hyperfine structure. A brief appendix lists the principal lines of the elements.

S. Katz

Vacuum Technique

Dushman, S. SCIENTIFIC FOUNDATIONS OF VACUUM TECHNIQUE. New York, John Wiley & Son, 1948.

This important addition to the field of vacuum technology presents a thorough treatment of both theory and experimental methods. The major divisions include the kinetic theory of gases, flow of gases through tubes and orifices, mechanical and diffusion pumps, manometers, sorption, gases and metals, clean-up of gases at low pressures, and vapor pressures and dissociation pressures. The very detailed coverage of all topics considered, and the extensive bibliography accompanying the text will make this book the standard reference in this field.

S. Katz

Sanderson, R. T. VACUUM MANIPULATION OF VOLATILE COMPOUNDS. New York, John Wiley & Son, 1948.

This book presents the fundamentals of vacuum technique in a form which should be most useful to the experimental chemist. The sections treated include glass blowing and materials of construction, methods of producing and measuring a high vacuum, low temperature manipulation, and manipulations of materials in vacuum systems. A very useful appendix gives a convenient list of vapor pressure data. While the treatment is not exhaustive, the topics discussed are handled with clarity and adequate detail.

S. Katz

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